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BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314			MCNELIS, KATHLEEN A	
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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/716,512
Filing Date: November 20, 2003
Appellant(s): INOUE ET AL.

Justin J. Cassell
For Appellant

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EXAMINER'S ANSWER

This is in response to the appeal brief filed 18 August 2006 appealing from the Office
action mailed 03 January 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

Claims 4 and 6 have been amended subsequent to the final rejection.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is incorrect.

The claims submitted with the appeal brief (Appendix IX) contain the amendments from the 10 April 2006 after final amendment.

The amendment after final rejection filed on 10 April 2006 was not entered on the grounds that the amended limitations were not in the finally rejected claims and therefore raised new issues.

Upon reconsideration, examiner has entered the amendment after final based on 1) the amendments are supported by the originally filed claims, 2) the amendments will not change the grounds for rejection and, 3) the that appellant has indicated (page 5 of the 4/10/2006 arguments) that the amendments are to correct typographical errors introduced into an earlier amendment of the claims.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

See comments above in Sections (3) and (4) regarding claim status.

(8) Evidence Relied Upon

5,769,970	Robelet et al.	06-1998
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JP 09-111412	Sumitomo Metal Ind. Ltd.	04-1997
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Vander Voort, George F., Carpenter Technology Corporation, "Embrittlement of Steels", ASM, Volume 1, Properties and Selection of Iron, 1991.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

The following ground(s) of rejection are applicable to the appealed claims.

Claims 1 to 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robelet et al. (US Patent 5,769,970) in view of ASM teaching by Vander Voort and Japanese patent 09-111412 (cited in IDS dated 3-18-04).

Robelet in claim 1 of column 6 discloses a microalloyed steel having a composition with constituents whose wt% ranges overlap those recited by the claims; such overlap in wt% ranges establishes a prima facie case of obviousness because it

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would be obvious to one of ordinary skill in the art to select the claimed alloy ranges from the broader disclosure of the prior art since the prior art has the same utility (connecting rod produced by fracture splitting). See MPEP 2144.05.

Even though 0.001 to 0.01% oxygen as recited by claims 1 and 4 is not taught by prior art, such would not be a patentable difference. Note that Vander Voort in figure 1 discloses that controlling oxygen amounts from 0.001 to 0.0037% in low alloy steel enhances toughness which is measured by Charpy impact test. Since toughness is desired and sought by prior art, then it would have been an obvious modification in view of the Vander Voort teaching to restrict oxygen content to 0.001 to 0.0037% to produce no more than the known and expected effect of such an addition.

Even though up to 0.02% Ti and up to 0.02% Zr recited by claims 2 and 5 are not disclosed by prior art, such would not be a patentable difference since they are optional elements having a lower limit of zero. Note "up to" is equivalent to zero. Moreover, it is well known in the art to incorporate small amounts of Ti into microalloy steel rods for fracture splitting as evident by JP '412, paragraph 32 on page 4 to increase strength and hardness. Since such properties are desired and sought by Robelet, then it would be an obvious modification for one skilled in the art to incorporate small amounts to the Robelet alloy to produce no more than the known and expected effect of such addition. Moreover, Zr is in the same family as Ti in the Periodic Table; hence they have the same chemical make-up and would be used interchangeably.

Robelet in claim 1 teaches machining element additions such as lead; and hence meets claims 3 and 6.

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Robelet on lines 5 to 62 in claim 1 discloses using steel as a connecting rod for an engine produced by fracture splitting and hence meet claim 7.

Robelet on lines 45 to 65 of column 5 discloses a connecting rod steel example which closely meets the claimed composition and when calculated, has a $C_{eq}=0.79$ and $T_{tr}=0.645$ which meet the recited claims. Even though the prior art does not teach the claimed equations, such would not be a patentable difference. Note that it has been held that there is no invention involved in the discovery of a general formula if it covers or closely covers a composition. Moreover, specific prior art example contains 0.105% V, but such element would be obvious to omit since a broad range of zero to 0.2% is taught, see lines 36 to 40 in column 3.

(10) Response to Argument

Appellant has argued:

1. The combination of Robelet, Vander Voort and Mitsuo does not teach every constituent content range required by the pending claims (p. 11, 1st paragraph of appeal brief). Appellant argues that the composition range of calcium and oxygen are critical to the claimed invention, as set forth on page 14 lines 3-23 (p. 12, 2nd paragraph of appeal brief).
 - a. Robelet does not disclose the calcium range of from 0.0001 to 0.01 wt % and Vander Voort and Mitsuo fail to make up for the shortcomings of Robelet. Robelet broadly suggest treating the disclosed steel with calcium, but does not suggest how much should be used (page 12, 3rd paragraph – page 13, 4th paragraph of appeal brief).

- b. Robelet does not disclose the use of any content of oxygen in the disclosed steel (page 12, 3rd paragraph of appeal brief). Vander Voort discusses the claimed contents of oxygen merely in an iron-oxygen alloy, and not in a micro-alloyed steel (page 13, 2nd paragraph of appeal brief). Mitsuo does not disclose the use of oxygen (page 13, 3rd paragraph of appeal brief). Therefore the combination does not teach the content ranges of calcium and oxygen taken in combination with other required constituents of the microalloyed steel (page 13, 4th paragraph of appeal brief).
 - c. Robelet does not teach or suggest combining the constituents in the manner of the pending claims, but instead teaches three different working examples having different concentrations of constituents (p. 13 last 2 paragraphs of appeal brief). Robelet clearly does not suggest the ranges of carbon and Ceq of the instant invention, but instead teaches higher carbon content and includes vanadium, which is excluded from the instant claims. As evidence of this, appellant compares the compositions of the three examples in Robelet to the instant claimed ranges (pages 14-15 of appeal brief).
- 2. The pending application teaches the criticality of the certain constituent content ranges recited in the claims which are not taught by the combination of Robelet, Vander Voort and Mitsuo (page 11, 2nd paragraph of appeal brief). Appellant cites:
 - a. page 8 line 16 through page 9 line 13,

- b. page 14 lines 3-12 and
 - c. page 13 lines 13-22
- of the specification as support for teaching the criticality of the claimed ranges (page 15 paragraph 4 –page 16 last paragraph of appeal brief).
3. The combination of Robelet, Vander Voort and Mitsuo would not motivate one skilled in the art to make the microalloyed steel having the constituent content ranges required by the pending claims (page 11, 3rd paragraph of appeal brief).
- a. None of the references provide any suggestion or motivation to combine to obtain the claimed microalloyed steel, specifically regarding the use of oxygen and calcium (page 17 of appeal brief).
 - b. Vander Voort teaches that in steels with concentration of carbon of 0.003, large variations in oxygen content have no influence on brittleness, therefore Vander Voort teaches away from using oxygen as an unnecessary addition (paragraph bridging pages 17 and 18 of appeal brief).
 - c. Vander Voort provides no suggestion of providing a certain range of oxygen for forming calcium oxide (page 18 of appeal brief).

Examiner's responses to these arguments is as follows:

1. The cited passage on page 14 lines 3-23 is a discussion regarding the oxygen content. Examiner does not agree that this provides evidence (e.g. comparative test data) of the criticality of the ranges of oxygen and/or

calcium. To establish unexpected results over a claimed range, appellant should compare a sufficient number of tests both inside and outside of the claimed range to show the criticality of the claimed range (see *In re Hill*, 284 F.2d 955, 128 USPQ 197 (CCPA 1960). In addition to the text on page 14, appellant has provided data in the specification (Tables 1 and 2, p. 19 and 21) comparing the inventive steel to comparative steel. All except for two (samples N and O) of the comparative examples contain oxygen and calcium within the range claimed by appellant. These two samples are not sufficient to establish unexpected results, at least because there are not samples bracketing the upper end of the claimed range and because the two samples N and O are not otherwise commensurate in scope with the closest applied prior art (i.e. Robelet).

- a. The range of between 0.0001 and 0.01% calcium is consistent with a trace, impurity level amount of calcium. Robelet discloses that all of the inventive steels may optionally be treated with calcium before casting (abstract and col. 4 lines 17-20). The steel of Robelet would be expected to retain trace residual calcium from the treatment; therefore the inclusion of between 0.0001 to 0.01% calcium is within the scope of Robelet. In the absence of evidence establishing the criticality of the claimed range, examiner maintains that this teaching includes the instant claimed range of from 0.0001 to 0.01 wt% Ca.

- b. Regarding the combination of Robelet with Vander Voort, since microalloyed steel is primarily iron, examiner maintains that the teaching is analogous and relevant. Further, the inclusion of between 0.001 to 0.01 wt% oxygen is consistent impurity levels, and examiner does not agree that appellant has provided sufficient evidence to establish the criticality of the claimed ranges of oxygen and calcium as discussed above.
- c. The teaching of Robelet is not limited to the three examples cited. The general ranges claimed by Robelet overlap the instant invention as discussed on page 2 of the 01/03/2006 office action, establishing a prima facie case of obviousness. With respect to the third example which was cited in the 01/03/2006 office action (i.e. Robelet col. 5 lines 45-65), the composition closely matches the instant claimed composition, with Si, P, Mn, Cr, Cu, Ni Ttr and Ceq being within the instant claimed ranges, carbon (0.39%) close to the instant claimed range (from 0.15 to 0.35%), and including 0.105% vanadium. It would have been obvious to modify the disclosed composition for the reasons given in the paragraph bridging pages 3-4 of the 01/03/2006 office action to omit vanadium, which is within the broad range (0 to 0.2%). Likewise, the broad teaching for carbon content (0.25 to 0.75%) in Robelet overlaps the instant claimed range (from 0.15 to 0.35%) as discussed on page 2 of the 01/03/2006 office action.
2. Examiner does not agree that the cited passages provide evidence of the criticality of the claimed ranges. To establish unexpected results over a

claimed range, appellant should compare a sufficient number of tests both inside and outside of the claimed range to show the criticality of the claimed range (see *In re Hill*, 284 F.2d 955, 128 USPQ 197 (CCPA 1960). Further, to rebut a prima facie case of obviousness based on overlapping ranges, an affidavit or declaration should be submitted under 37 CFR 1.132 comparing the claimed subject matter with the closest prior art as set forth in section 716.02(e) of the MPEP.

- a. The citation on page 8 line 16 – page 9 line 13 of the specification is a discussion of the carbon content referencing a generalized figure (figure 3) which shows a non-quantitative comparison of “Low-carbon steel” with “High-carbon steel.” This is not sufficient evidence of the criticality of the claimed range (e.g. comparative test data) over the closest applied prior art (i.e. Robelet). In addition to the passages cited in the appeal brief, appellant has provided data in the specification (Table 1, p. 19 & Table 2, p. 21), which includes 1 comparative example (sample B) with carbon exceeding the instant claimed range. This sample is not commensurate in scope with the closest applied prior art (i.e. Robelet).
- b. The citation on page 14 lines 3-12 is a discussion of calcium content required to form a solid solution of Ca in MnS and is not sufficient evidence of the criticality of the claimed range (e.g. comparative test data) over the closest applied prior art. See response to item 1 above regarding

comparative data also included in specification, but not cited by appellant in appeal brief.

- c. The citation on page 13 lines 13-22 is apparently a typographical error, and should refer to page 14, lines 13-22 for a discussion of oxygen content.

This discussion on page 14 is not sufficient evidence of the criticality of the claimed range (e.g. comparative test data) over the closest applied prior art, which appellant acknowledges will contain oxygen as an inevitable impurity (appeal brief p. 16). See response to item 1 above regarding comparative data also included in specification, but not cited by appellant in appeal brief.

3. The steel composition is essentially disclosed by Robelet. Motivation to combine the teaching of Vander Voort regarding the addition of oxygen is discussed above in Section 9 and in the paragraph bridging pages 2 and 3 of the 1/3/2006 office action, i.e. to enhance toughness, which is desired and sought in the prior art.

- a. Robelet discloses the use of calcium as discussed above. Vander Voort teaches the use of oxygen as discussed above.

- b. The motive to control the oxygen content is to increase toughness.

Examiner does not agree that a teaching that the addition of oxygen will not affect brittleness is teaching away, since brittleness is only one factor affecting toughness (i.e. toughness requires a combination of strength and ductility).

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- c. The fact that appellant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious.

See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,



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